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July 11 2003

Inclusive Jet Cross Section Update: 146 pb^{-1}

Blessing for Summer 2003 conferences...

We now have updated results based on 146 pb^{-1}, 70% more data than was presented in the Spring (85 pb^{-1}) conferences.

Better understanding of the energy scale uncertainty (5% $\rightarrow$ 3%)

Analysis details can be found in CDF6298 (writeup for the blessed Spring 2003 results)

Plots collected at:

`http://ncdf76.fnal.gov/~chlebana/qcd/ana/incJet/blessSummer2003/`

- Same unsmearing procedure as used in Run I and for the preliminary Run II results

- Used offline version 4.10.4

- Redid Calorimetry and Jet reconstruction
$\rightarrow$ corrected the falling response in the high η region...

- Using the 5.5% energy scale correction and 3% uncertainty

- Offline luminosity scaled by 1.9%

ntuples based on DataAccess located at:

`fcdfsgi2:/cdf/data40b/s0/qcd/chlebana/jets_4.10.4`

Good Run Selection

```
AND rc.SHIFTCREW_STATUS = 1
AND rc.RUNCONTROL_STATUS = 1
AND RC.RUNNUMBER >= 138815
AND rc.CLC_STATUS = 1
AND rc.L1T_STATUS = 1
AND rc.L2T_STATUS = 1
AND rc.L3T_STATUS = 1
AND rc.CAL_STATUS = 1
AND rc.CCAL_OFFLINE = 1
AND (rc.COT_STATUS = 1 OR rc.COT_OFFLINE = 1)
```

Started with gjet08 and gjet09 datasets: 174 pb^{-1}

Offline bits set for runs: 138815 - 163527
No "CCAL bits" for runs: 163956 - 164958 (about 11 pb^{-1})
$\rightarrow$ *removed the rc.CCAL_OFFLINE = 1 requirement*

Also require that event count for the J20 in ntuple match with that recorded in the database, removed 25 runs for 8.4 pb^{-1}

About 32 pb^{-1} do not pass this good run criteria
About 15 pb^{-1} of data unprocessed (July 9 2003)

Prescale Determination

The prescale on the Level 2 15 GeV Cluster (CL15) trigger changed part way into the run.

L1 Trigger	L2 Trigger	L3 Trigger
ST5 (20)	CL15 (12, 25)	J20
	CL40 (1)	J50
ST10 (1)	CL60 (8)	J70
	CL90 (1)	J100

Need to determine the effective prescale from the data

For an independent trigger counted the number of events that "Fired" the trigger compared to the number that was "Accepted" after prescaling.

Trigger	Fired	Accepted	Effective Prescale
ST5	2.70714e+06	135998	19.9058
C15	2.83026e+06	150739	18.7759
C60	2.36417e+06	295247	8.0074

Vertex Cut Correction

$\rightarrow$ Scaling the data by 1.05 before unsmearing.

W.K. Sakumoto and A. Hocker, *"Event* $|Zvtx| < 60cm$ *Cut Efficiency for Run II"*, CDF/ANAL/ELECTROWEAK/CDFR/6331.

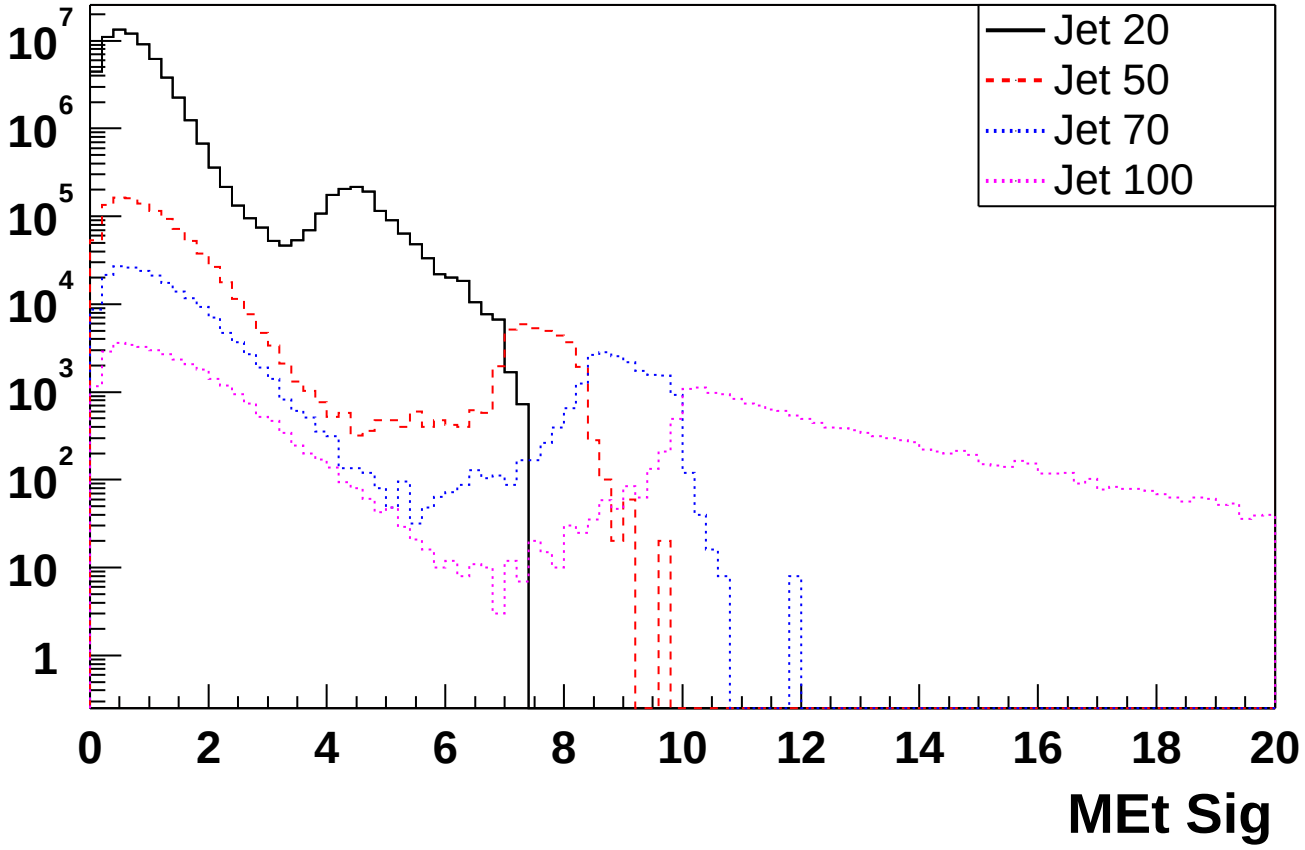
Event Selection

$0.1 < |\eta_{Det}| < 0.7$

$|z| \leq 60$ cm

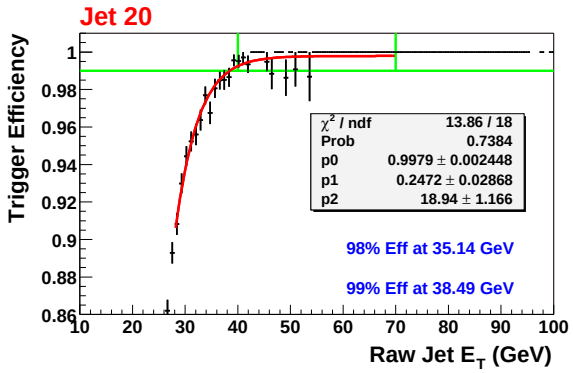
MEtSig $\leq$ X

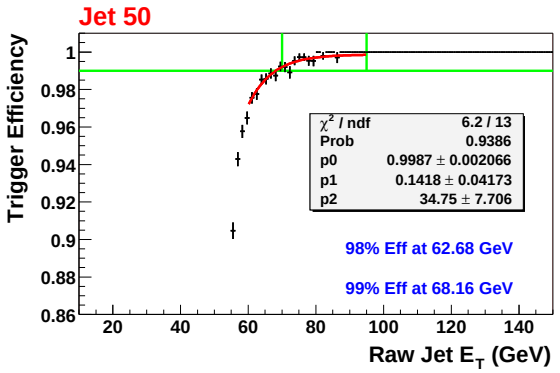
$E_{tot} \leq 1500$ GeV

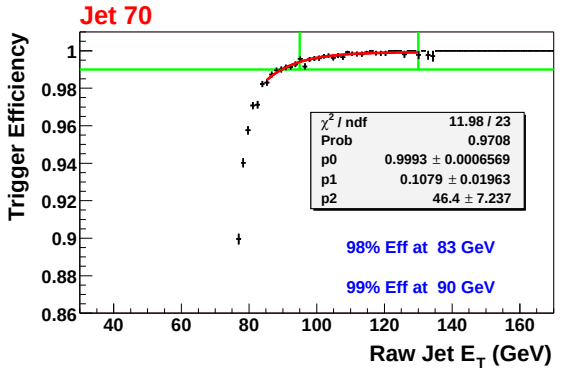


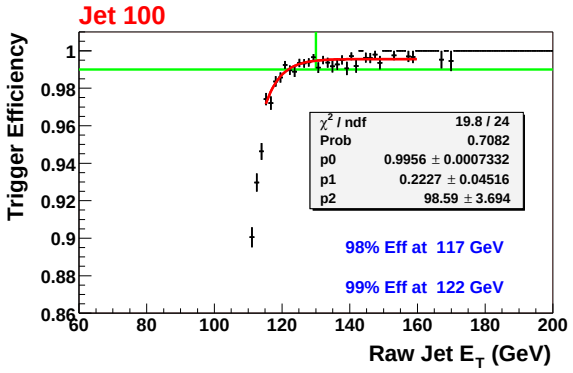

```
if ((jetFlag == 20)  && (metSig > 3.5)) evtOK = 0;
if ((jetFlag == 50)  && (metSig > 5))   evtOK = 0;
if ((jetFlag == 70)  && (metSig > 6))   evtOK = 0;
if ((jetFlag == 100) && (metSig > 7))   evtOK = 0;
```

CDF Run II Preliminary





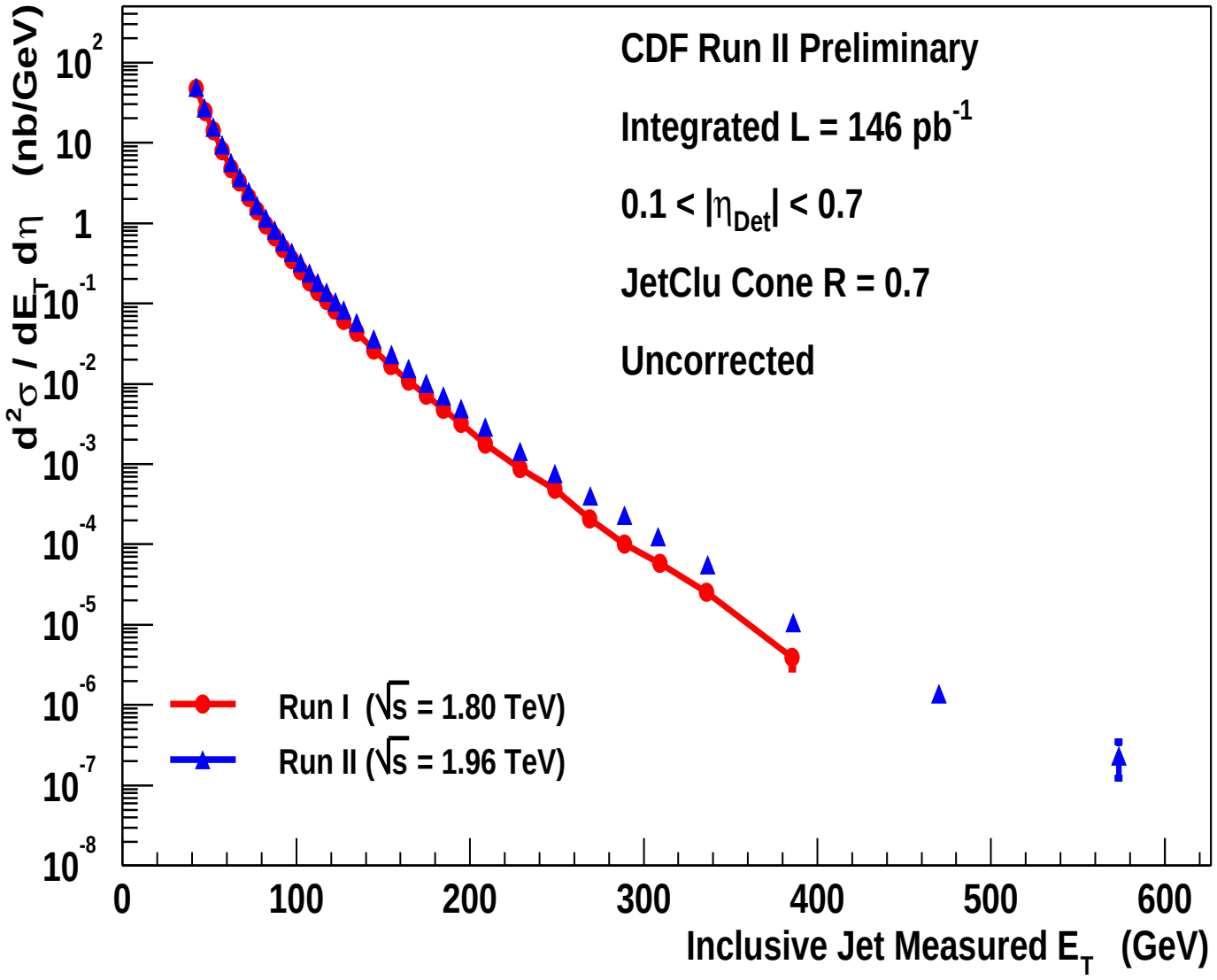




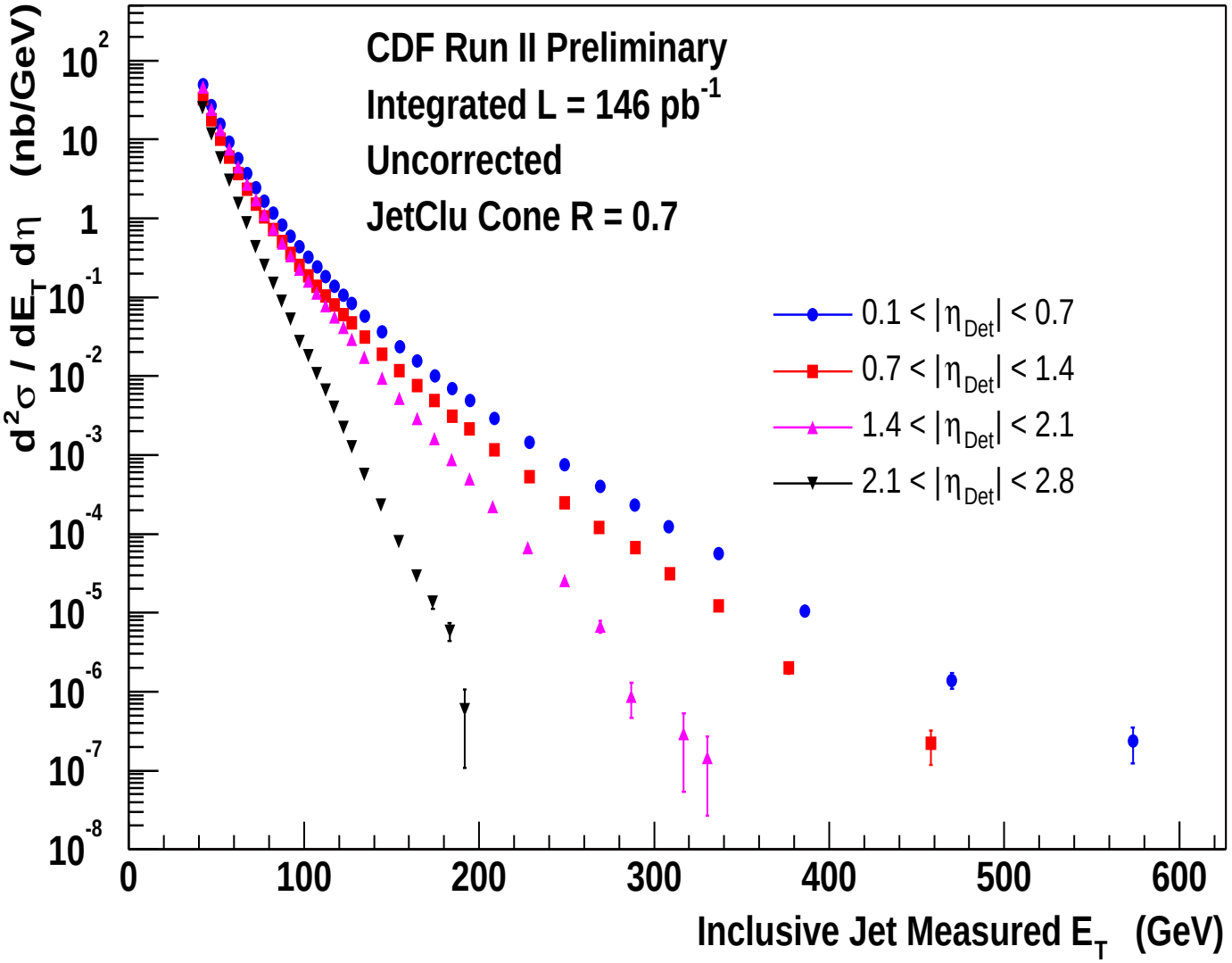
Staying far away from trigger threshold effects...

Trigger	ET Range	Trigger	ET Range
J20	40 - 70	J70	95 - 130
J50	70 - 95	J100	130 - 620

For Blessing



For Blessing



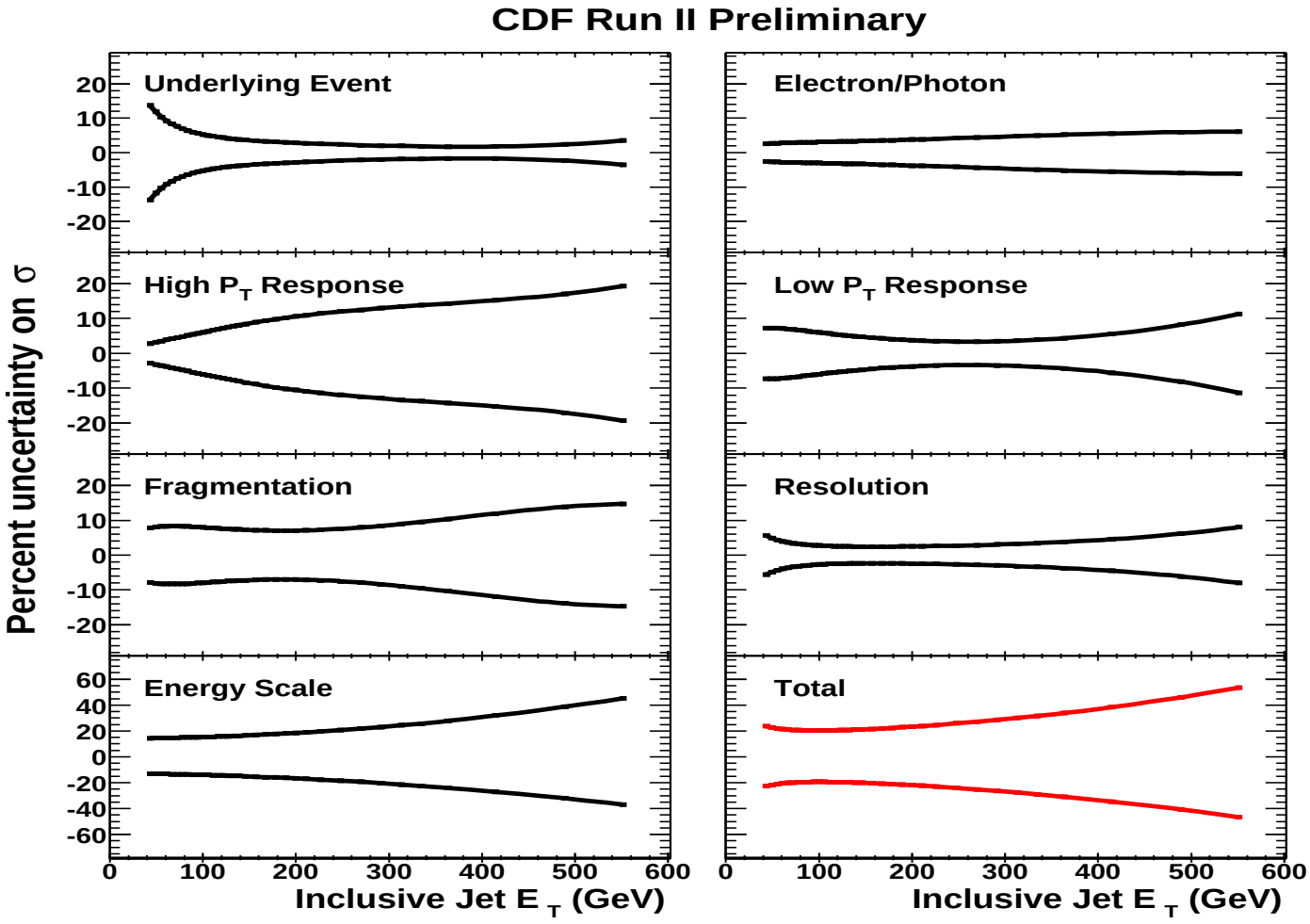
Systematic Errors

Consider the same sources of systematic error as in Run I.

Details can be found in FERMILAB-Pub-01/008-E

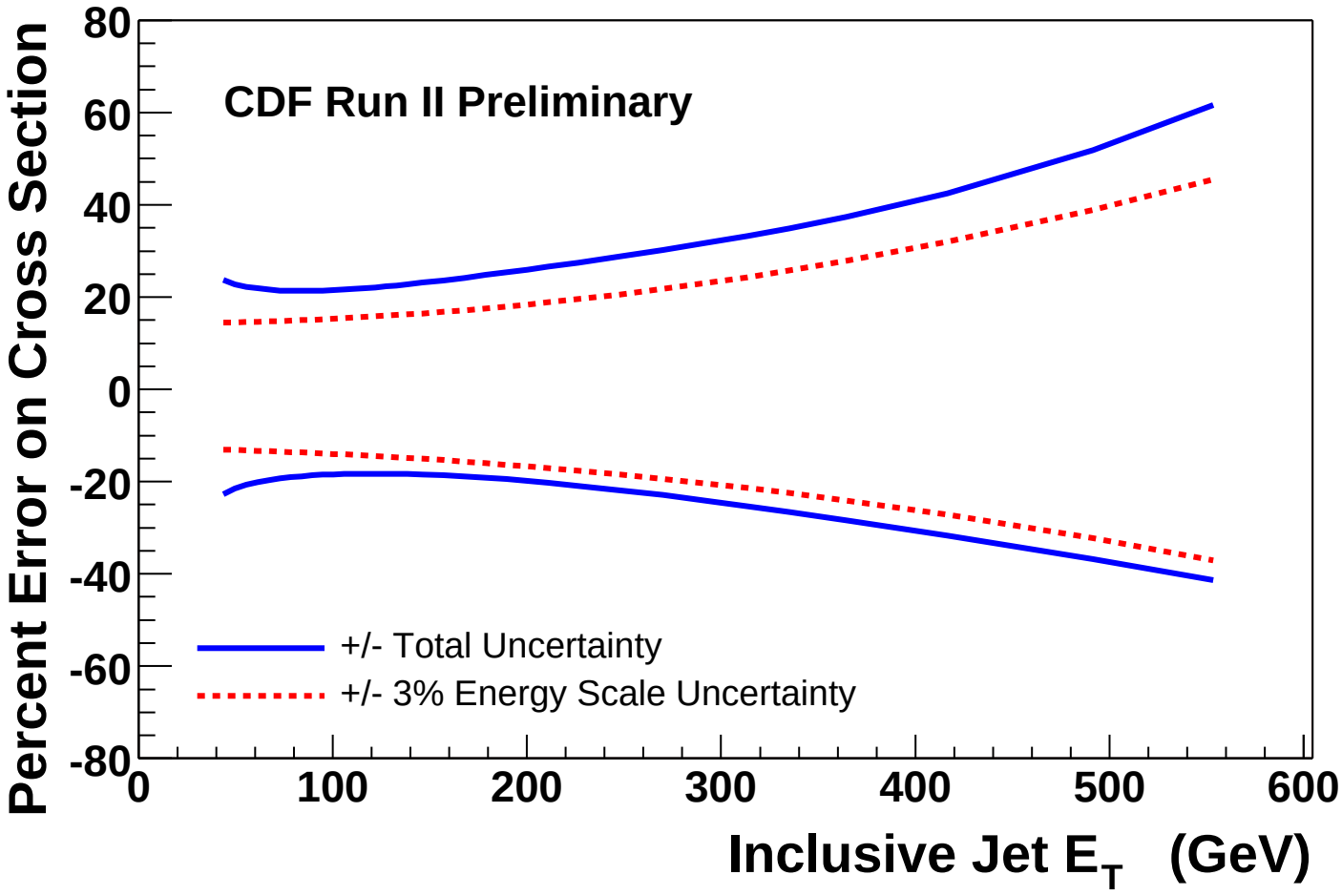
- "hi pt": High p_T hadronic response +3.2% -2.2%.
- "lo pt": Low p_T hadronic response $\pm$5%.
- "E scale": Energy scale stability $\pm$5%.
- "frag": Fragmentation.
- "uEvt": Underlying event $\pm$30%.
- "el/ph": Electron/photon response $\pm$2%.
- "Res": Calorimeter resolution $\pm$10%.

For Blessing



The dominant source of systematic error comes from the energy scale uncertainty (reduced from 5% to 3%).

For Blessing...



Error bands on the plots now show the total systematic error

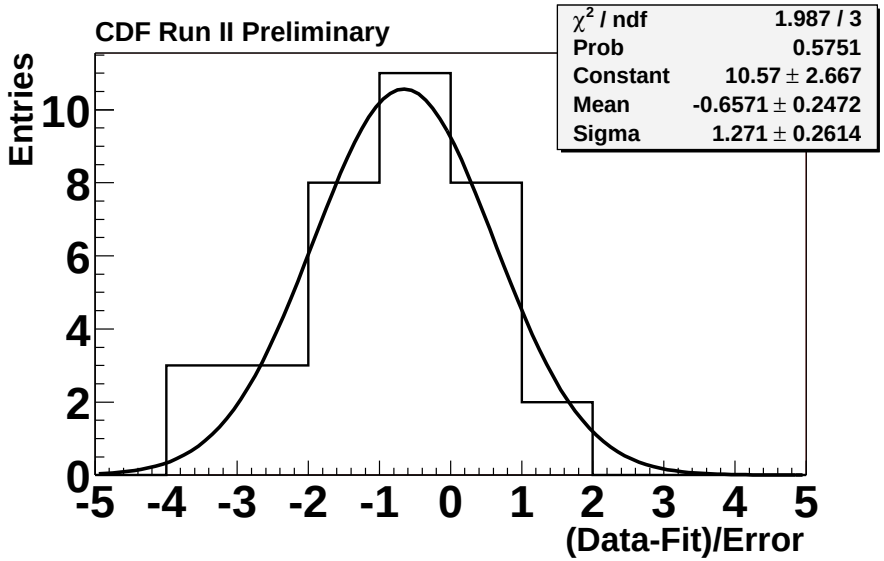
Other sanity checks

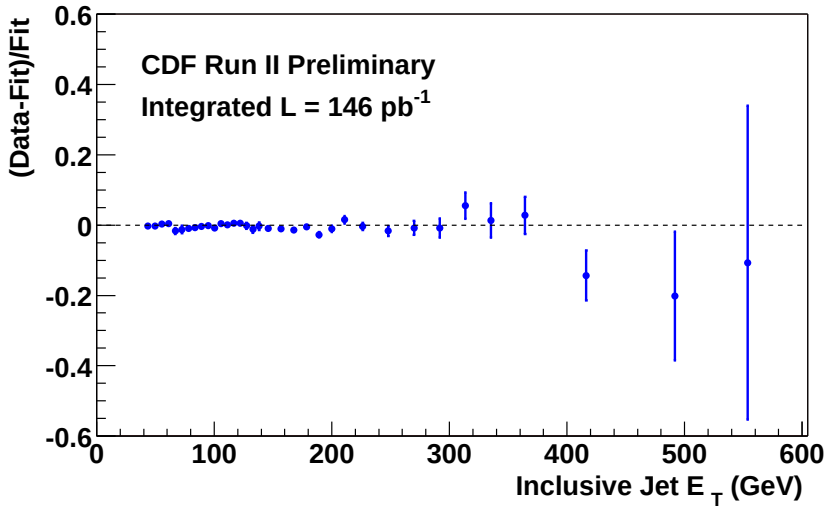
• Comparisons of the MC and DATA measured distributions have the same qualitative features

• Varied the resolution functions used in the unsmearing $\rightarrow$ had a negligible effect on the corrected cross section.

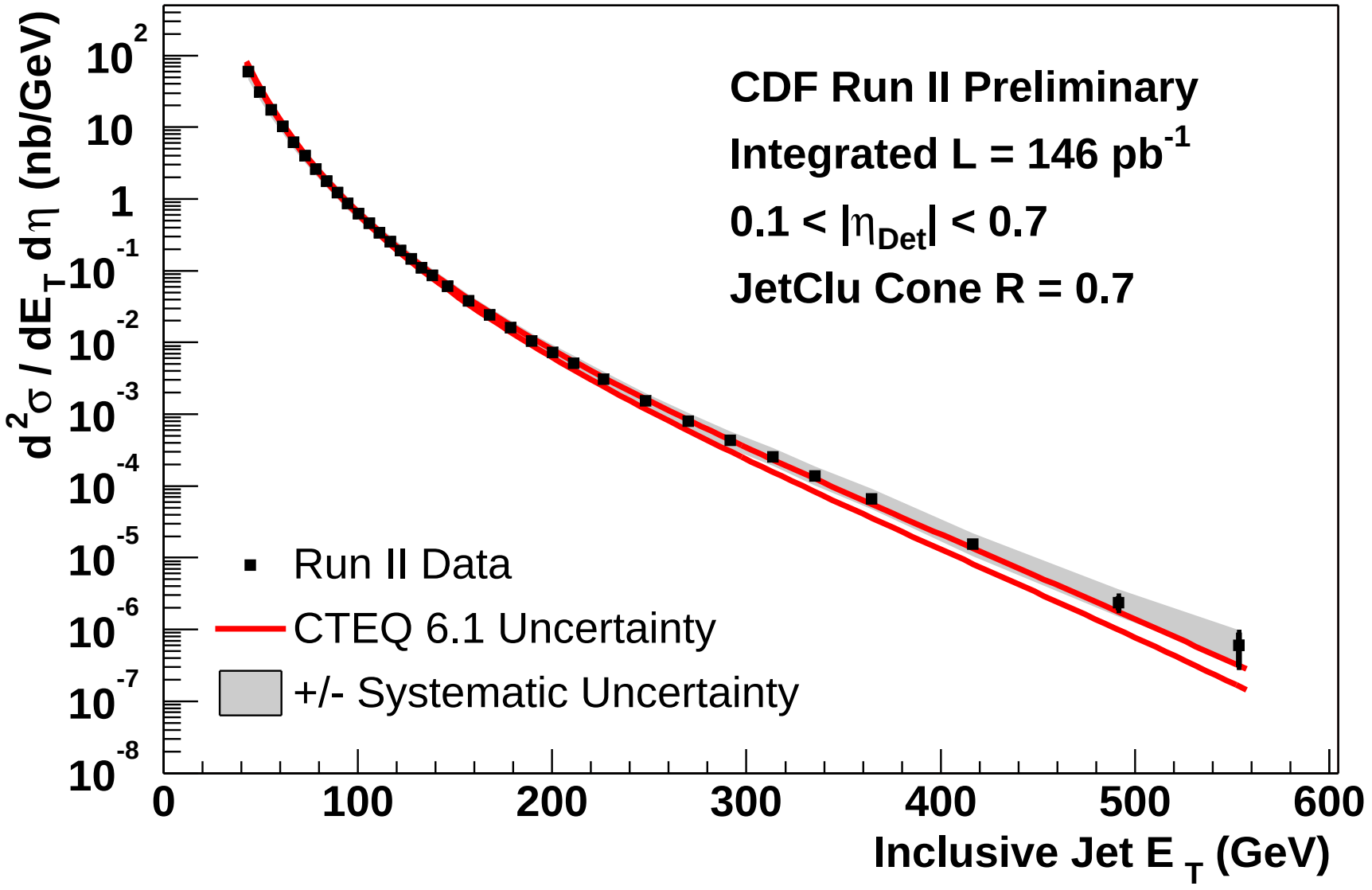
With the increased statistics the data is smoothing out.

For Blessing

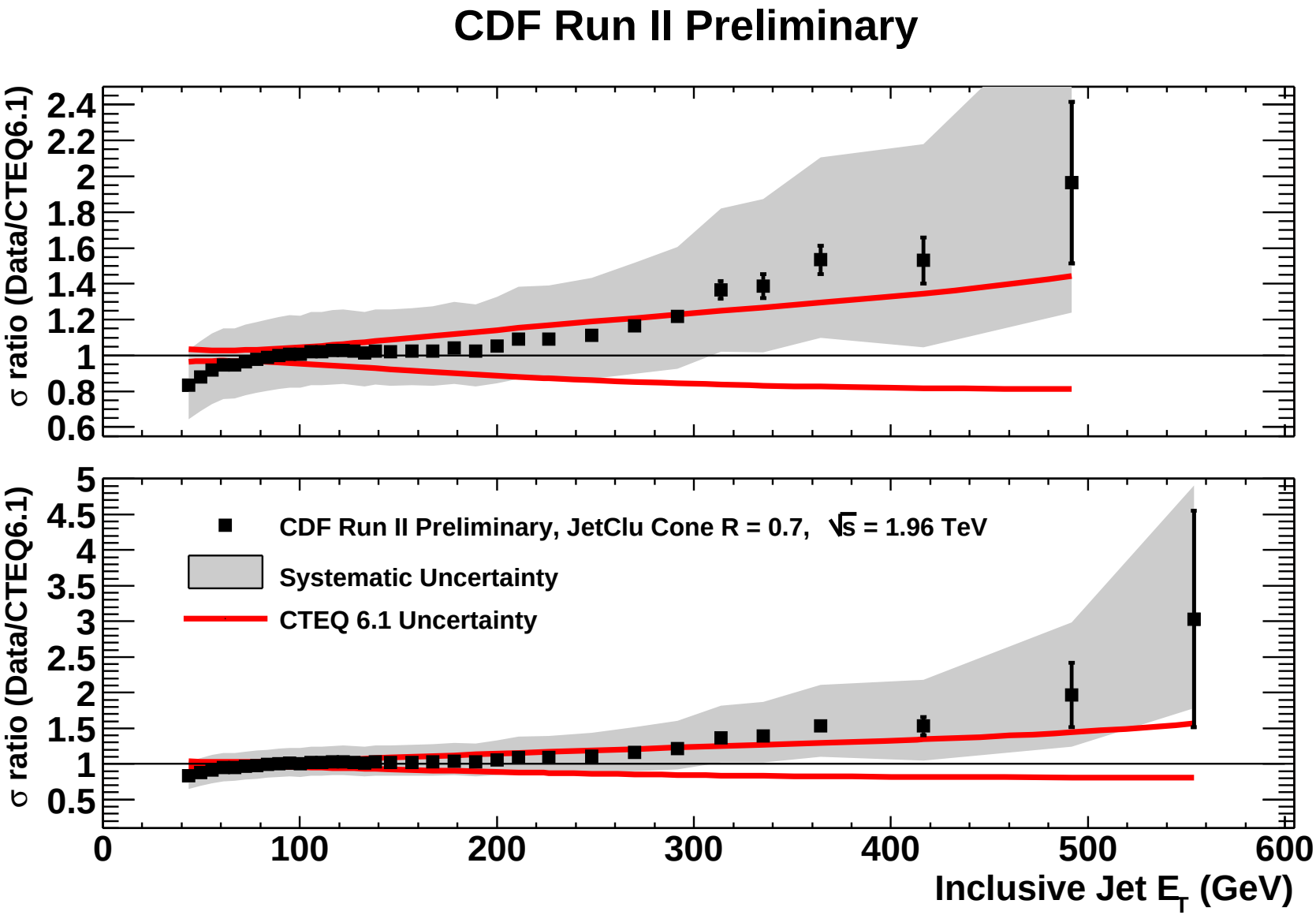




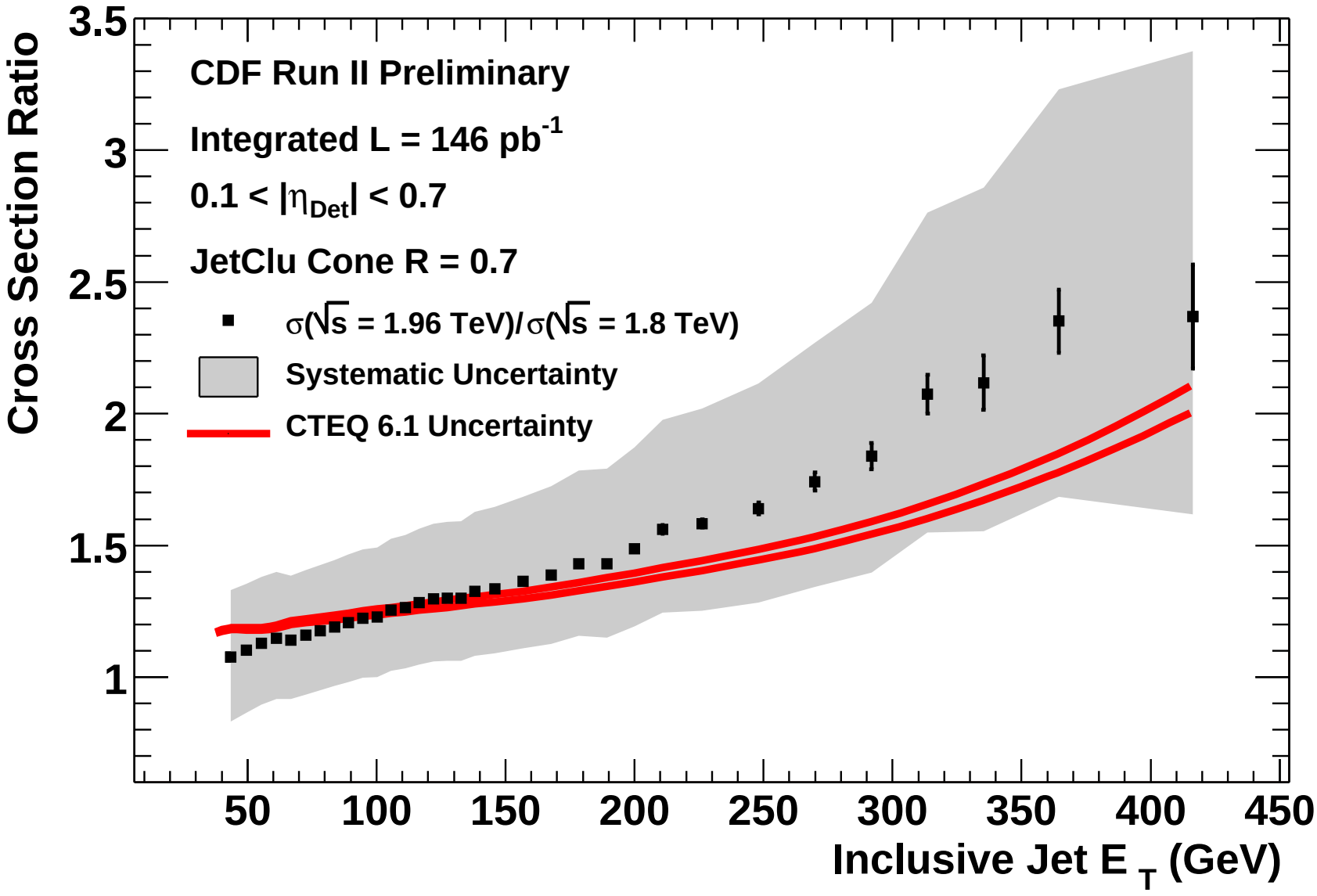
For Blessing...



For Blessing…

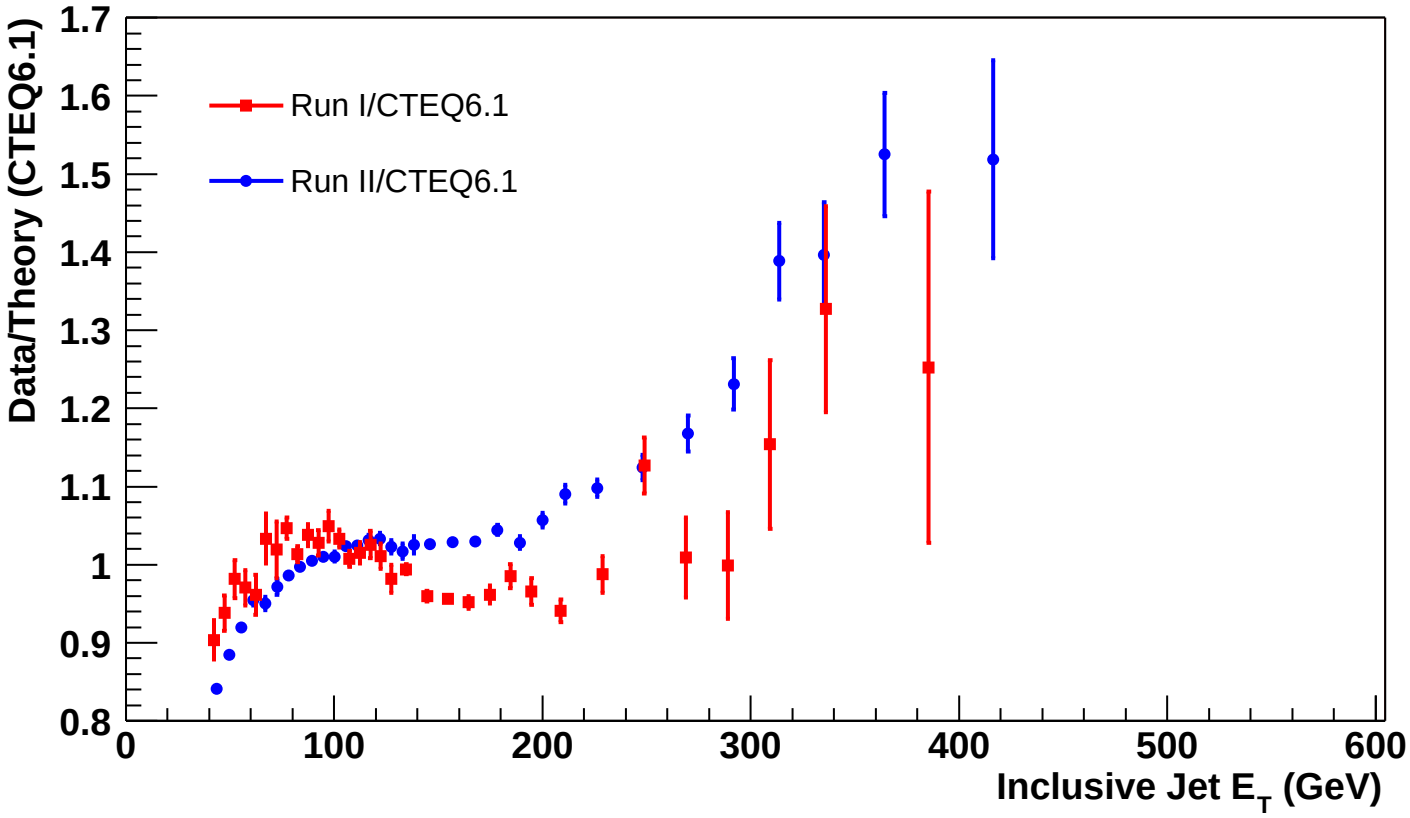


For Blessing…



See same features as in Run I

Low at low E_T high at high E_T



With the increased statistics these features are more evident...

Conclusions

We now have significantly more data (more than the Run I analyzes)

Better understanding of the energy scale (5% $\rightarrow$ 3%).

See same features as in Run I and with the increased statistics they are more evident.

Still want to do additional checks before showing the corrected cross section. Hope to show the corrected cross section at Lepton-Photon

Want to show *measured distributions* based on 146 pb^{-1} at EPS